Name:

at1124exam: Radicals and Squares (v917)

Question 1

Simplify the radical expressions.

$\sqrt{98}$ $\sqrt{63}$ $\sqrt{27}$

$\sqrt{7 \cdot 7 \cdot 2}$ $\sqrt{3 \cdot 3 \cdot 7}$ $\sqrt{3 \cdot 3 \cdot 3}$

$7\sqrt{2}$ $3\sqrt{7}$ $3\sqrt{3}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-9)^2}{4} - 10 = -1$$

First, add 10 to both sides.

$$\frac{(x-9)^2}{4} = 9$$

Then, multiply both sides by 4.

$$(x-9)^2 = 36$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 9 = \pm 6$$

Add 9 to both sides.

$$x = 9 \pm 6$$

So the two solutions are $x = 15$ and $x = 3$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 18x = 63$$

$$x^2 - 18x + 81 = 63 + 81$$
$$x^2 - 18x + 81 = 144$$
$$(x - 9)^2 = 144$$
$$x - 9 = \pm 12$$
$$x = 9 \pm 12$$
$$x = 21 \quad \text{or} \quad x = -3$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x - h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 2x^2 + 28x + 94$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 + 14x) + 94$$

We want a perfect square. Halve 14 and square the result to get 49 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 + 14x + 49 - 49) + 94$$

Factor the perfect-square trinomial.

$$y = 2((x + 7)^2 - 49) + 94$$

Distribute the 2.

$$y = 2(x + 7)^2 - 98 + 94$$

Combine the constants to get **vertex form**:

$$y = 2(x + 7)^2 - 4$$

The vertex is at point $(-7, -4)$.